FIG.1

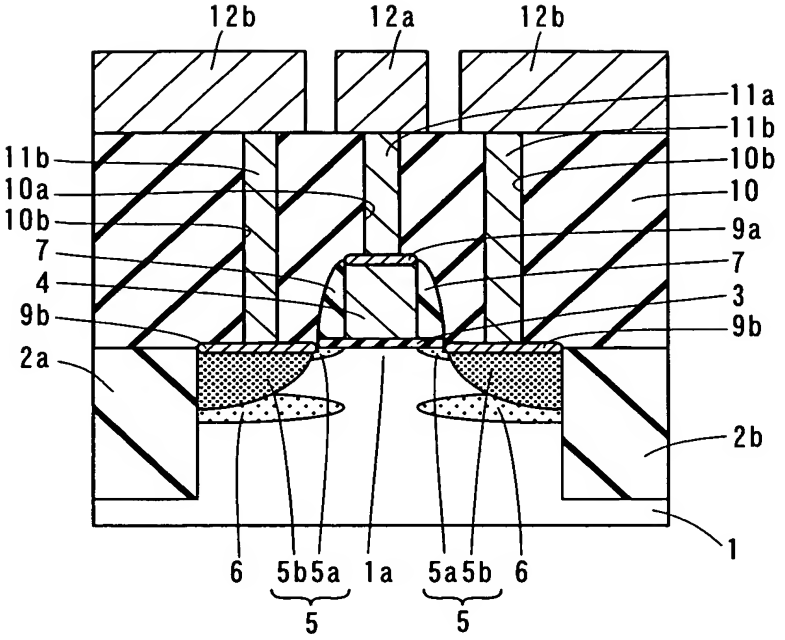

12b
12a
12b
11a
11b
10b
10
9a
7
3
9b
11b
10a
10b
7
4
9b
2a
2b
1
6
5b
5a
1a
5a
5b
6
5
5

FIG.2

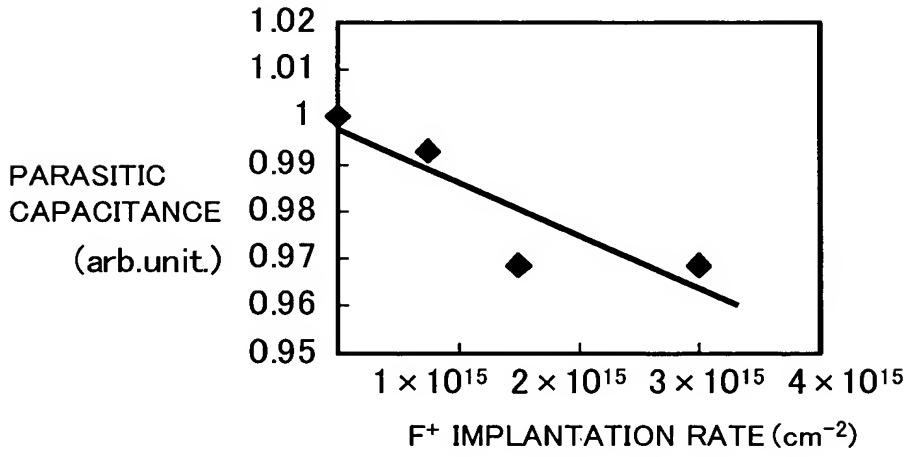

1.02
1.01
1
0.99
0.98
0.97
0.96
0.95
PARASITIC CAPACITANCE (arb.unit.)
1×10^15
2×10^15
3×10^15
4×10^15
F+ IMPLANTATION RATE (cm^-2)

FIG.3

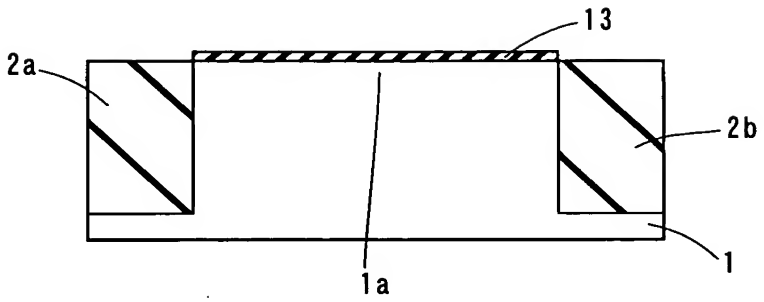


FIG.4

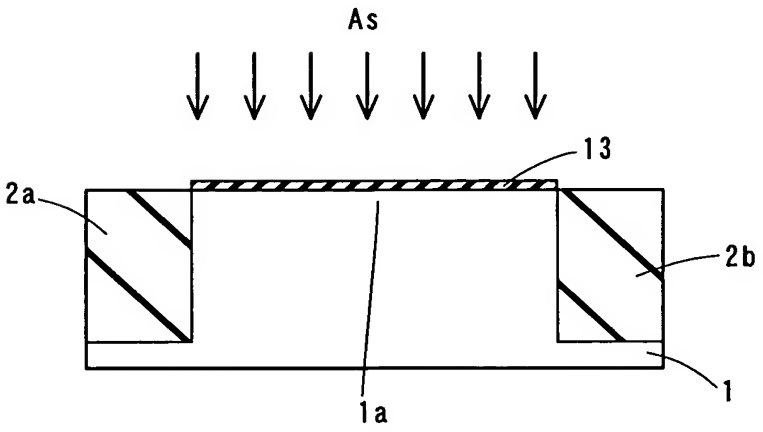


FIG.5

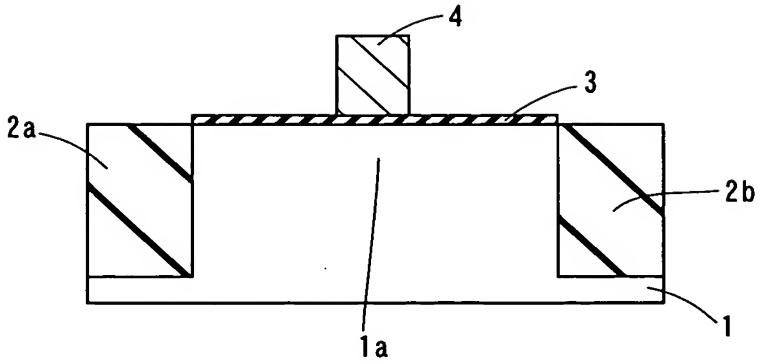


FIG.6

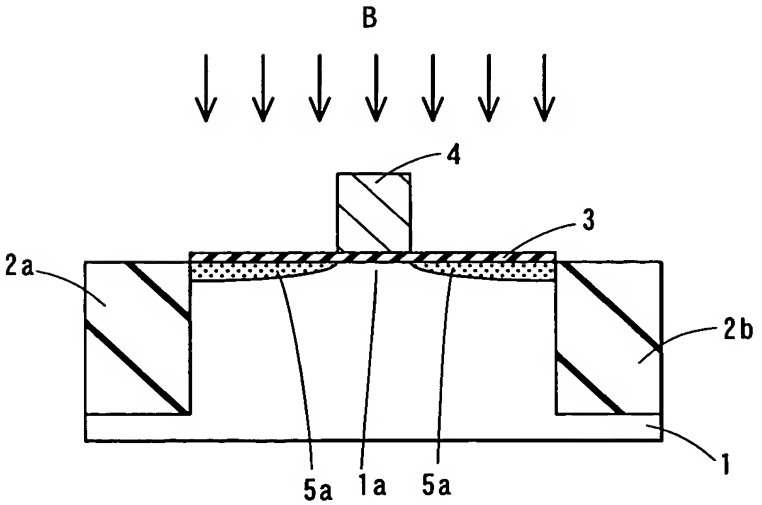


FIG.7

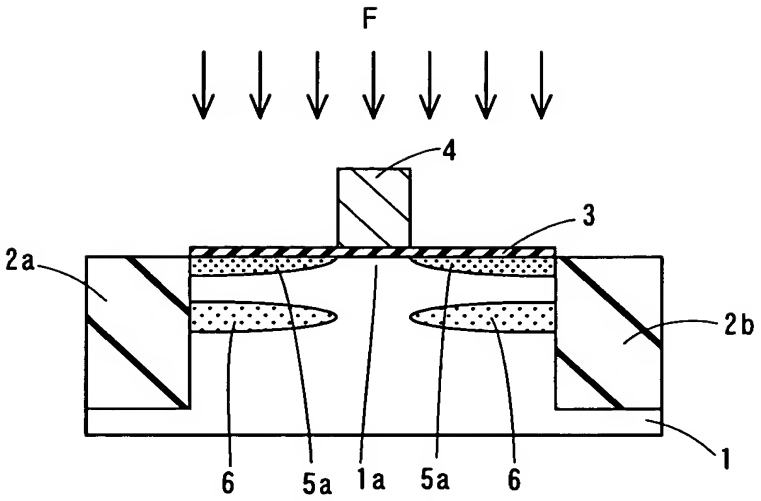


FIG.8

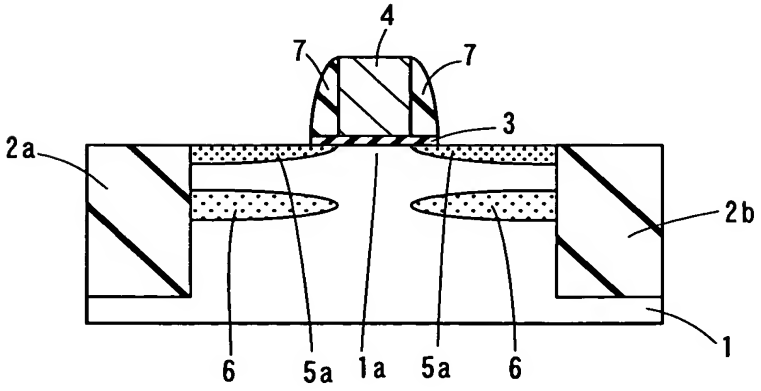


FIG.9

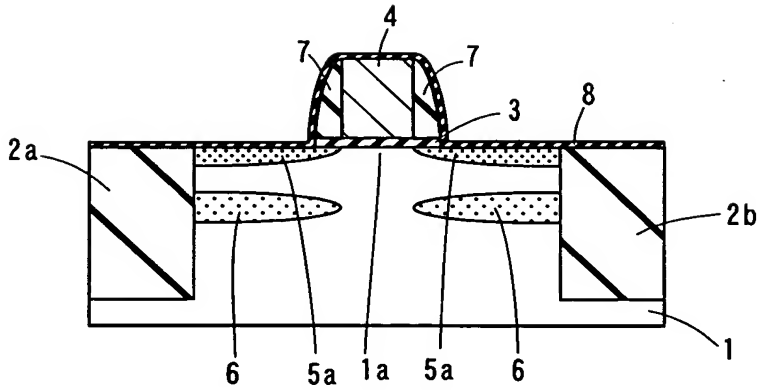


FIG.10

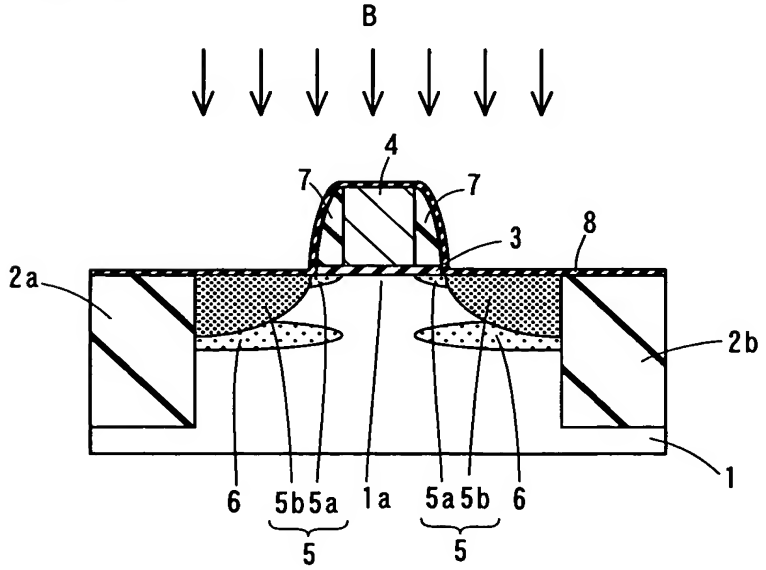


FIG.11

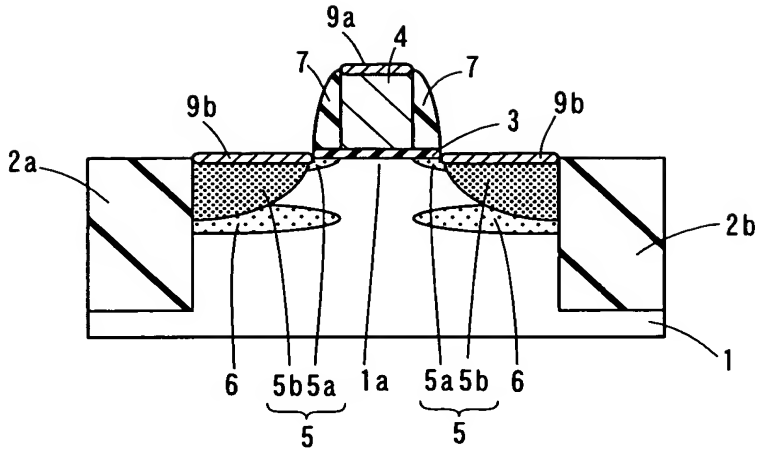

9a
4
7
7
9b
3
9b
2a
2b
1
6
5b
5a
1a
5a
5b
6
5
5

FIG.12

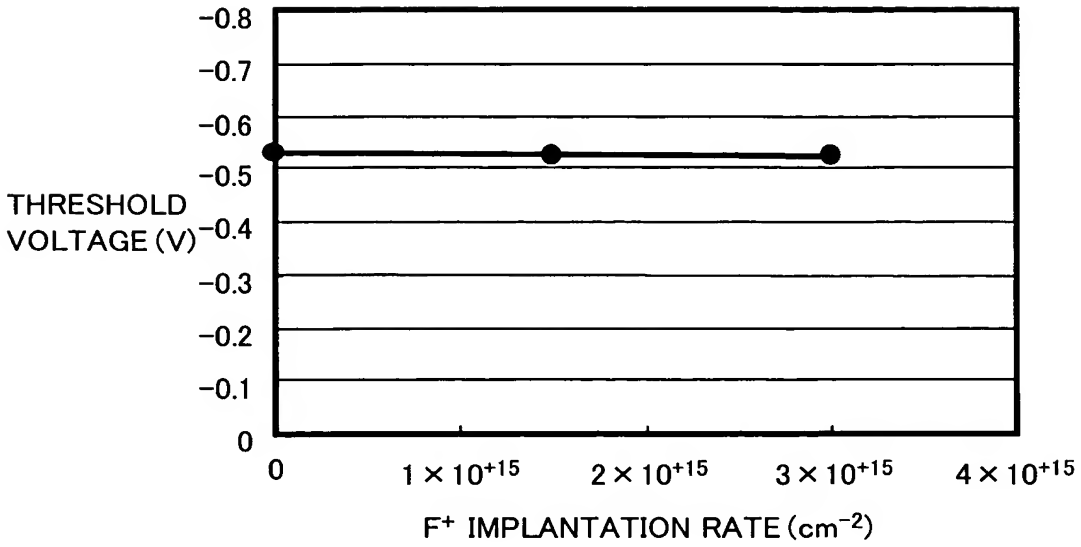

−0.8
−0.7
−0.6
−0.5
−0.4
−0.3
−0.2
−0.1
0
THRESHOLD VOLTAGE (V)
0
1×10+15
2×10+15
3×10+15
4×10+15
F+ IMPLANTATION RATE (cm−2)

FIG.13

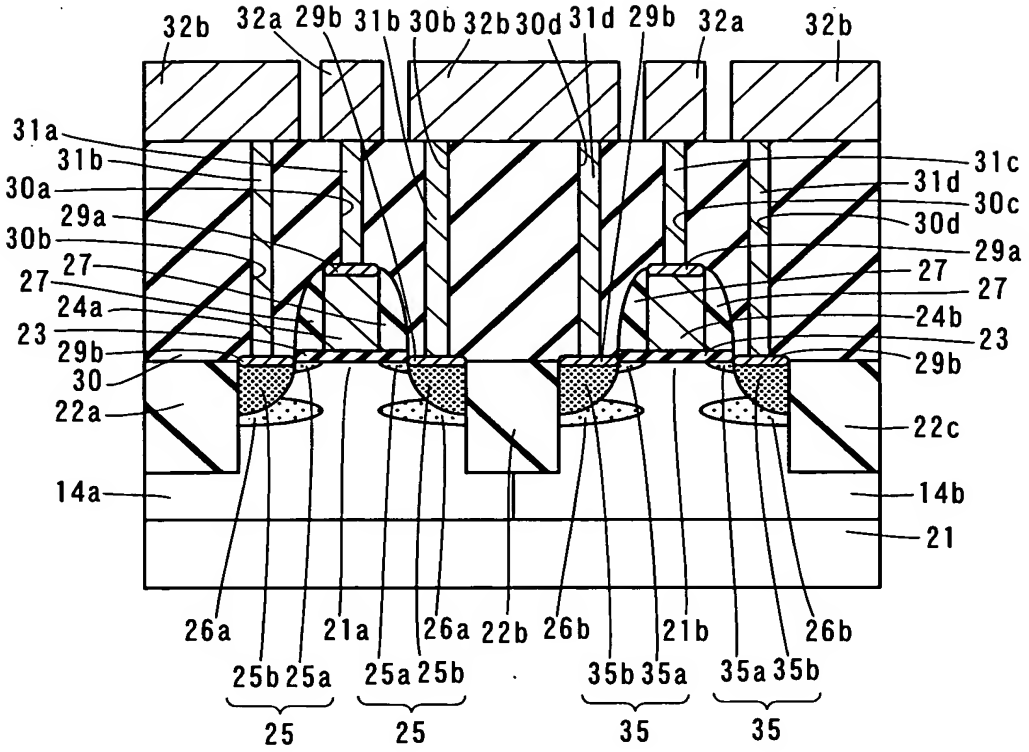

32b
32a
29b
31b
30b
32b
30d
31d
29b
32a
32b
31a
31b
30a
29a
30b
27
27
24a
23
29b
30
22a
14a
31c
31d
30c
30d
29a
27
27
24b
23
29b
22c
14b
21
26a
25b
25a
21a
25a
25b
26a
22b
26b
35b
35a
21b
35a
35b
26b
25
25
35
35

FIG.14

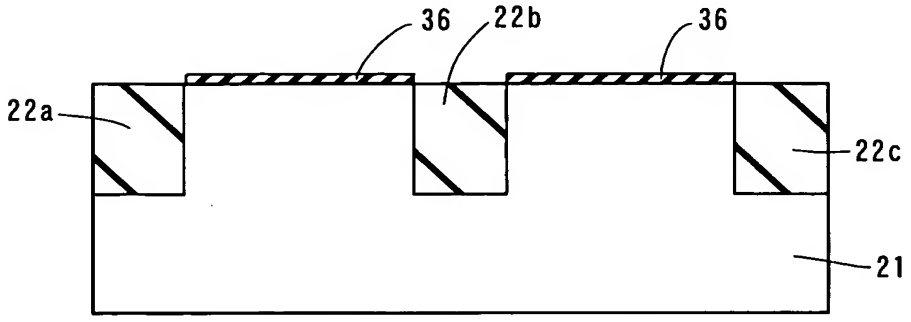

36
22b
36
22a
22c
21

FIG.15

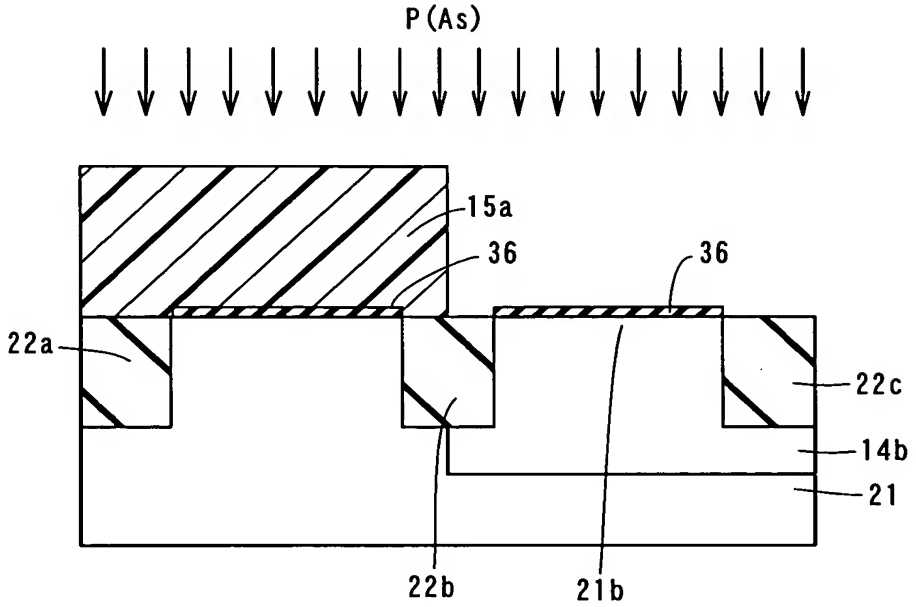

P(As)
15a
36
36
22a
22c
14b
21
22b
21b

FIG.16

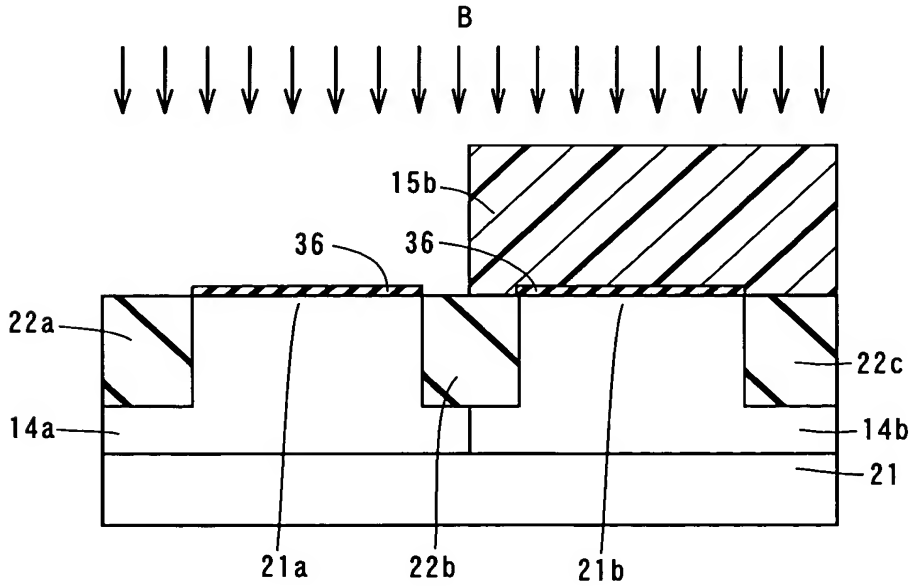

B
15b
36
36
22a
22c
14a
14b
21
21a
22b
21b

FIG.17

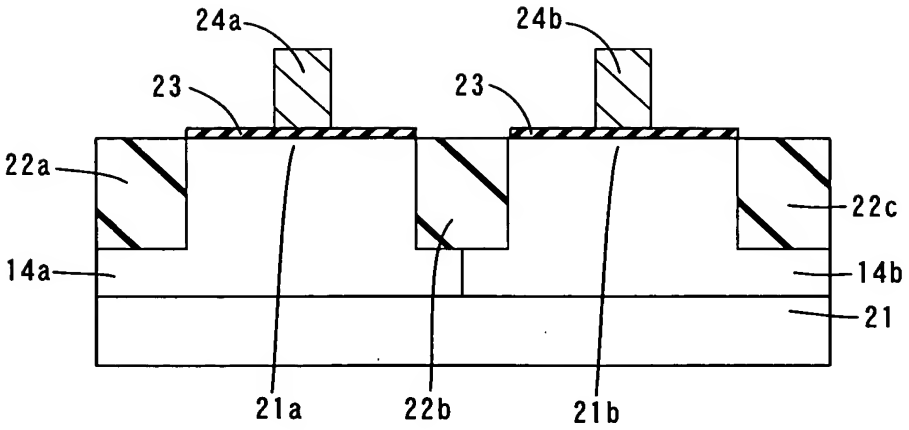

24a
24b
23
23
22a
22c
14a
14b
21
21a
22b
21b

FIG.18

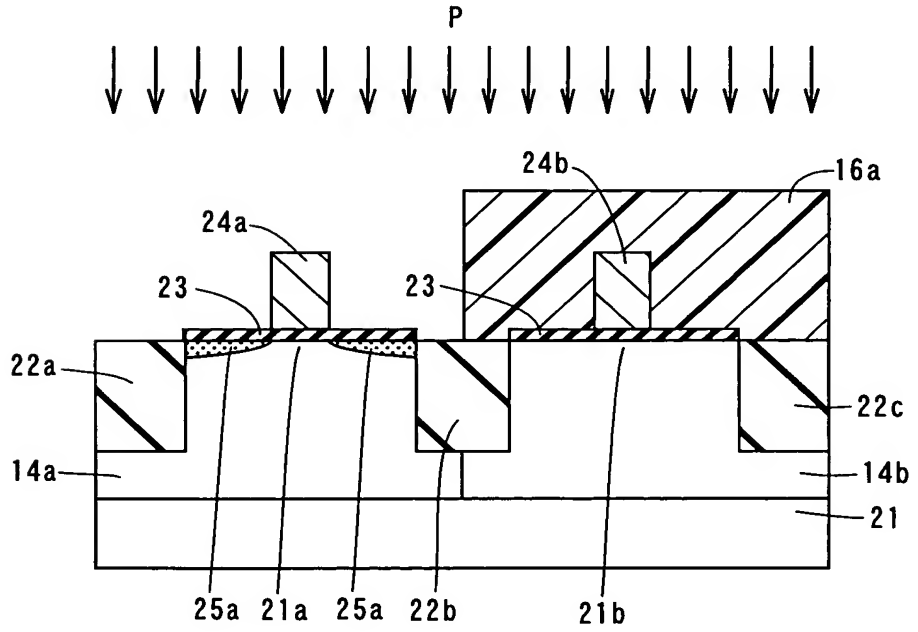

P
24b
16a
24a
23
23
22a
22c
14a
14b
21
25a
21a
25a
22b
21b

FIG.19

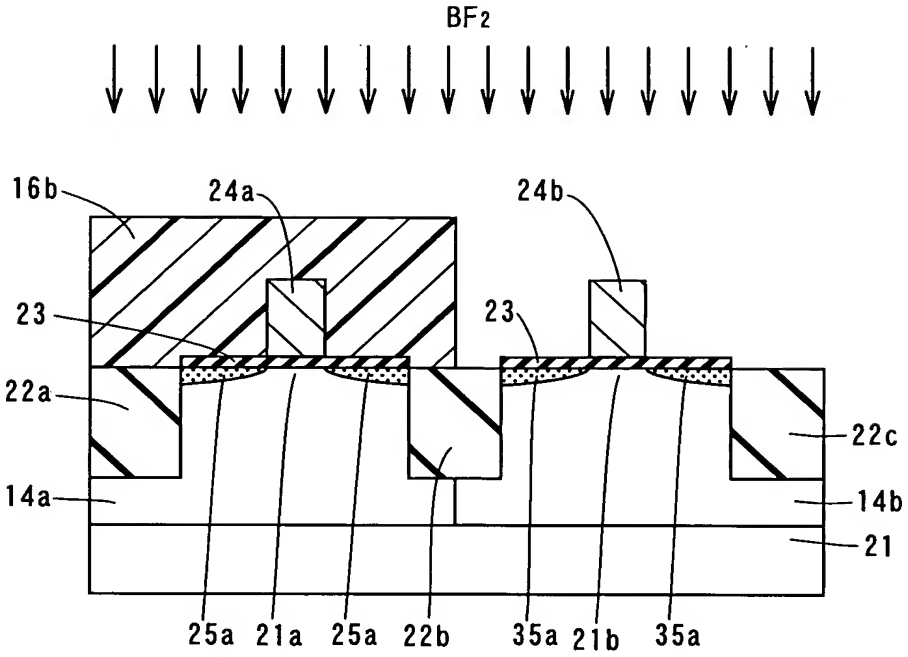

BF2
16b
24a
24b
23
23
22a
22c
14a
14b
21
25a
21a
25a
22b
35a
21b
35a

FIG.20

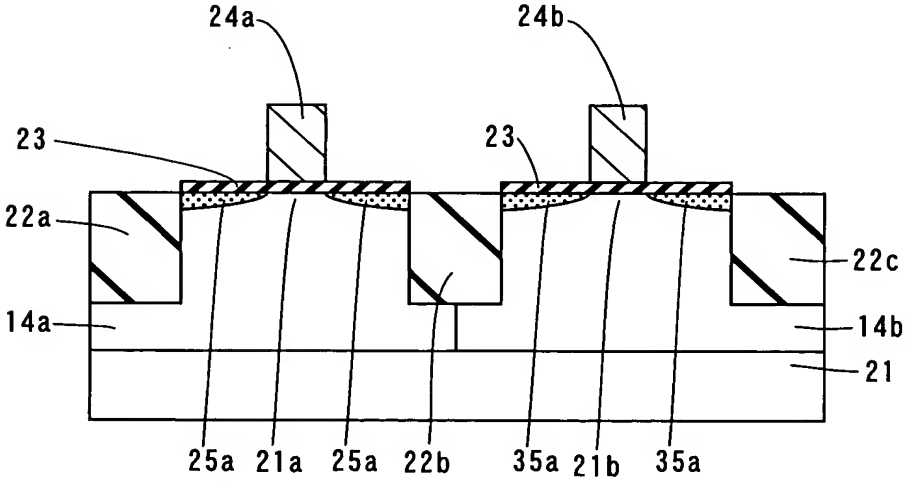

24a
24b
23
23
22a
22c
14a
14b
21
25a
21a
25a
22b
35a
21b
35a

FIG.21

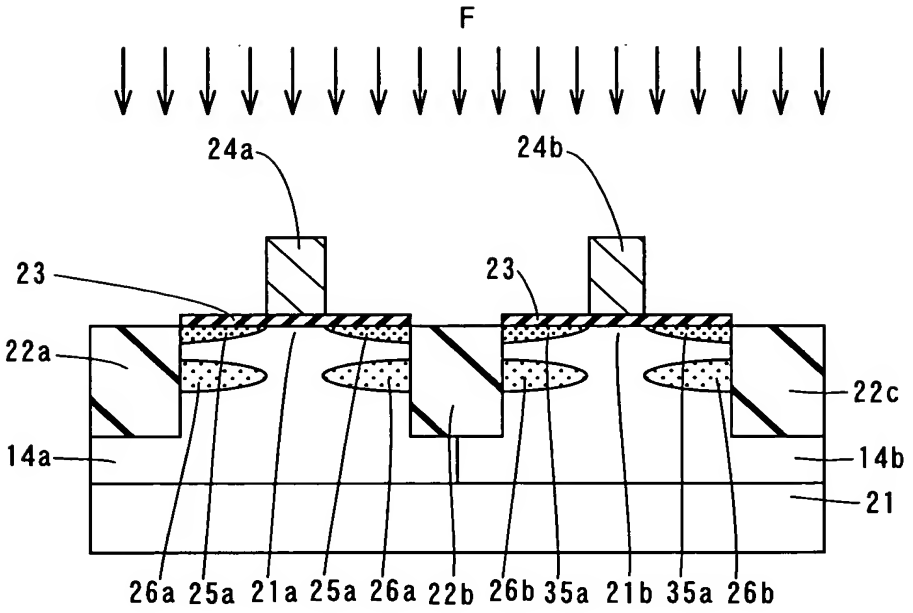

F
24a
24b
23
23
22a
22c
14a
14b
21
26a 25a 21a 25a 26a 22b 26b 35a 21b 35a 26b

FIG.22

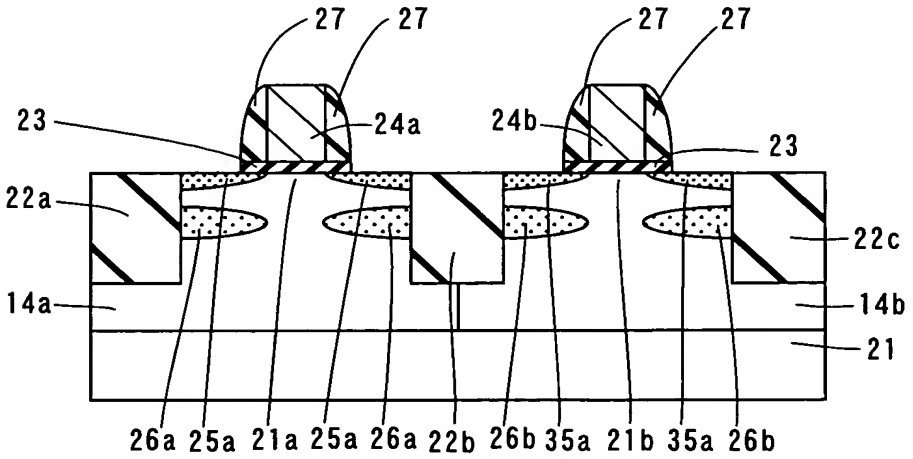

27
27
27
27
23
24a
24b
23
22a
22c
14a
14b
21
26a 25a 21a 25a 26a 22b 26b 35a 21b 35a 26b

FIG.23

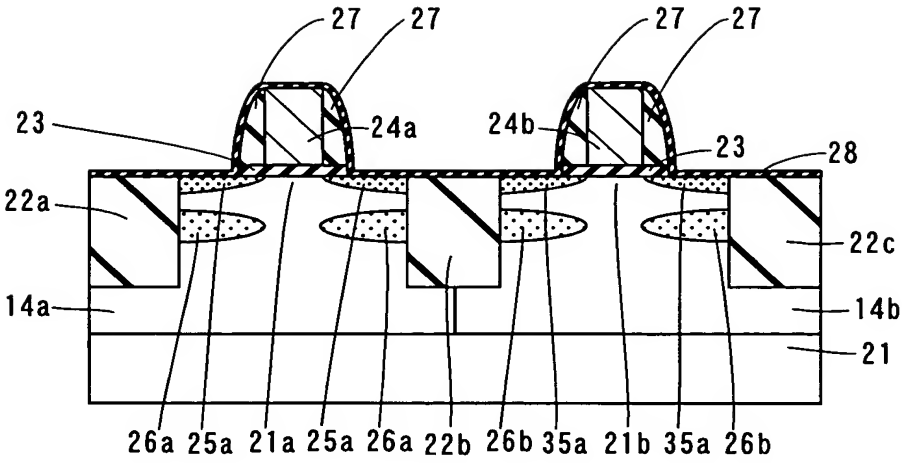

27
27
27
27
23
24a
24b
23
28
22a
22c
14a
14b
21
26a 25a 21a 25a 26a 22b 26b 35a 21b 35a 26b

FIG.24

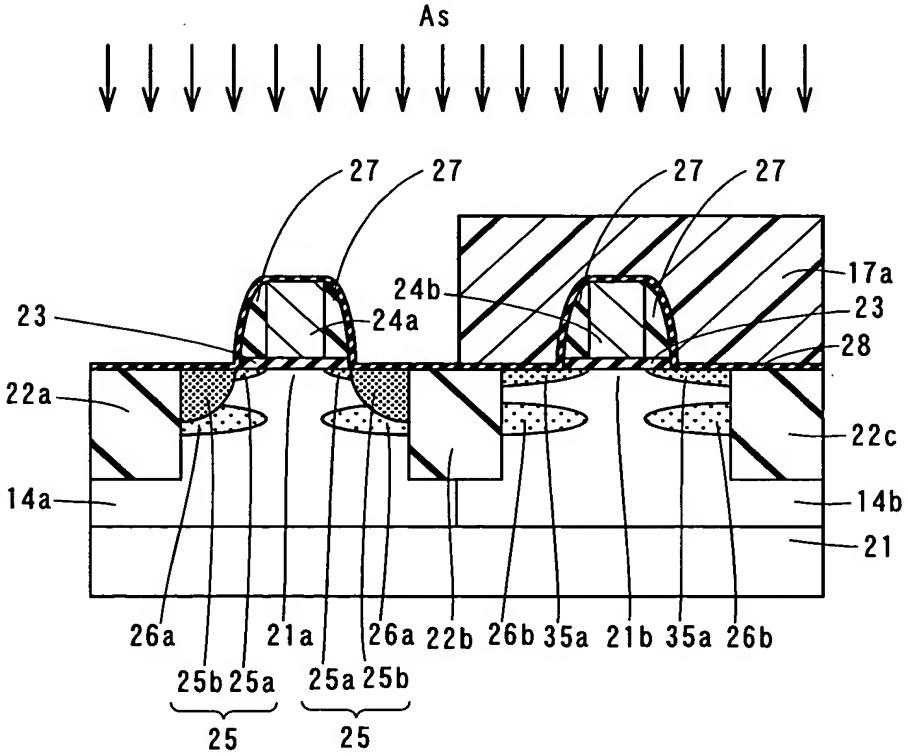

As
27
27
27
27
17a
24b
23
24a
23
28
22a
22c
14a
14b
21
26a
21a
26a
22b
26b
35a
21b
35a
26b
25b
25a
25a
25b
25
25

FIG.25

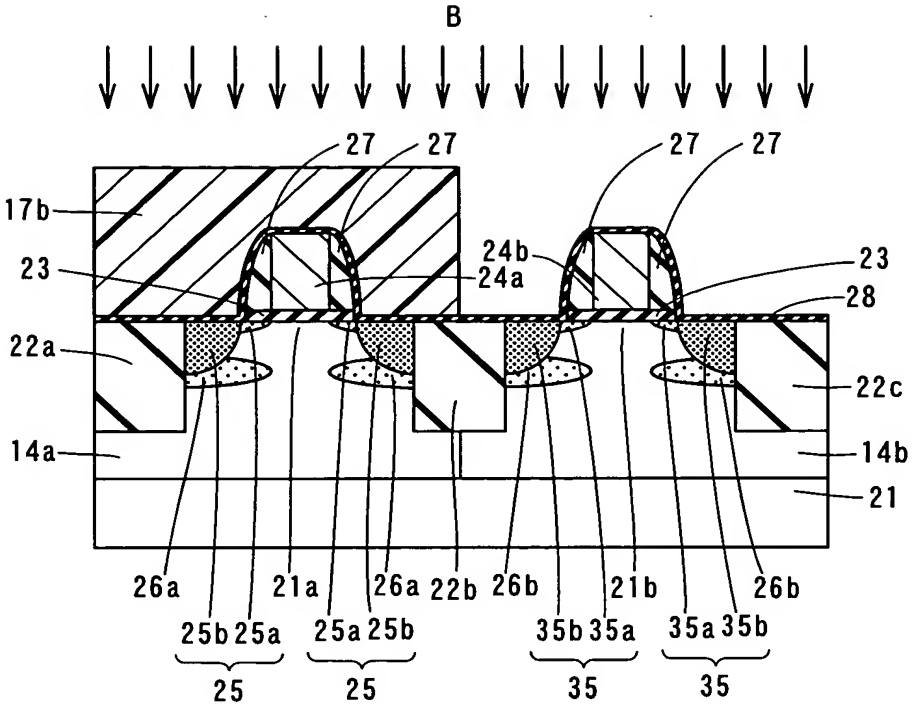

B
27
27
27
27
17b
23
24b
24a
23
28
22a
22c
14a
14b
21
26a
21a
26a
22b
26b
21b
26b
25b
25a
25a
25b
35b
35a
35a
35b
25
25
35
35

FIG.26

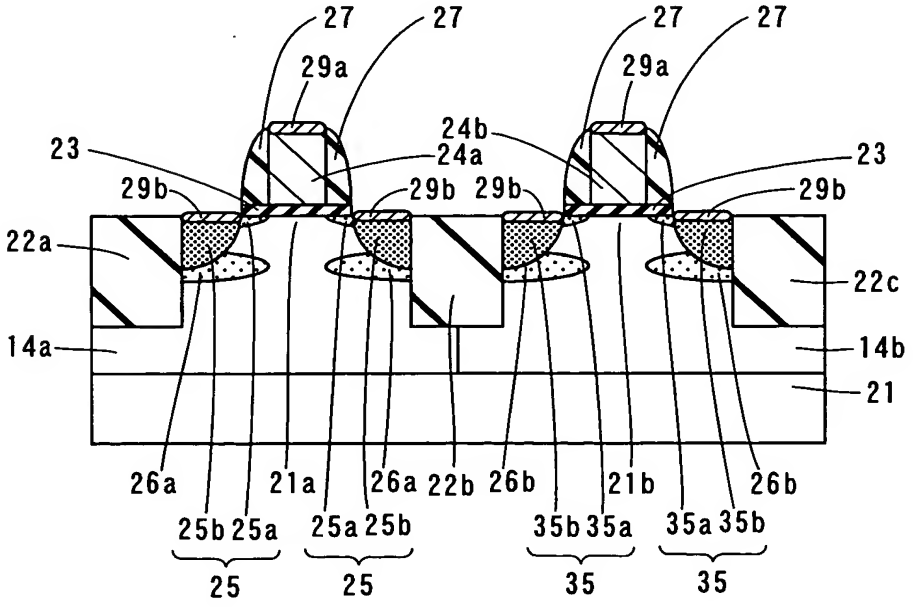

27
27
27
27
29a
29a
24b
23
24a
23
29b
29b
29b
29b
29b
22a
22c
14a
14b
21
26a
21a
26a
22b
26b
21b
26b
25b
25a
25a
25b
35b
35a
35a
35b
25
25
35
35

FIG.27

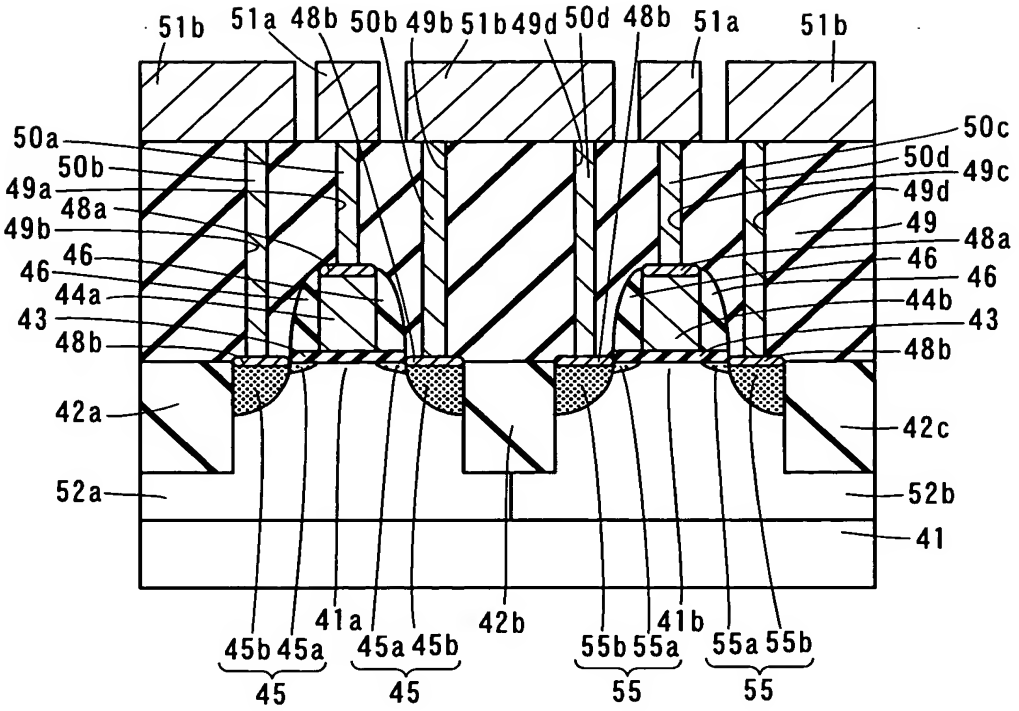

51b
51a
48b
50b
49b
51b
49d
50d
48b
51a
51b
50a
50b
49a
48a
49b
46
46
44a
43
48b
42a
52a
50c
50d
49c
49d
49
48a
46
46
44b
43
48b
42c
52b
41
41a
42b
41b
45b
45a
45a
45b
55b
55a
55a
55b
45
45
55
55

FIG.28

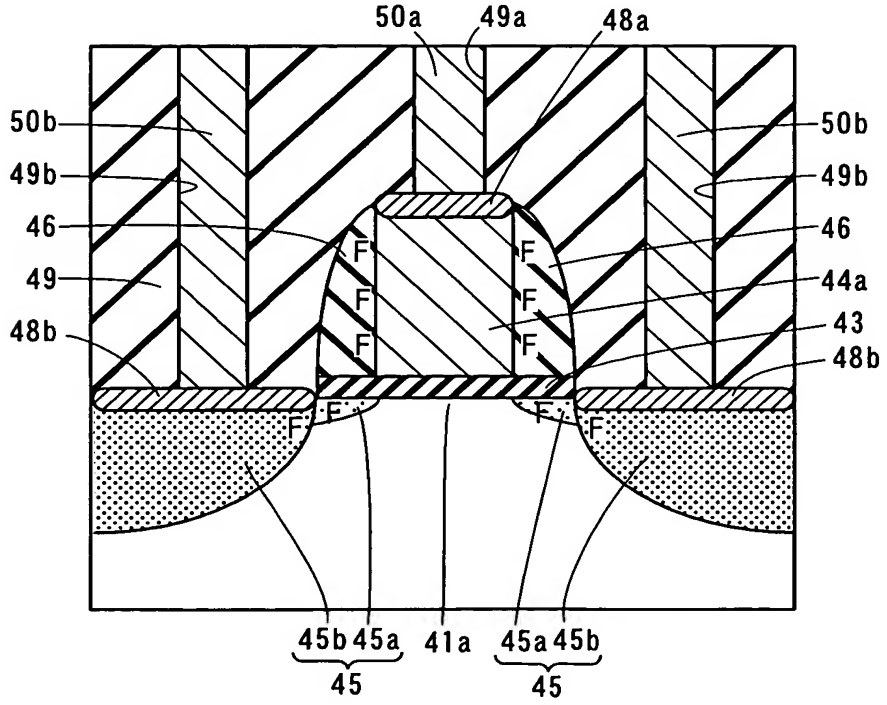

50a
49a
48a
50b
49b
46
49
48b
50b
49b
46
44a
43
48b
F
F
F
F
F
F
F
F
F
F
45b
45a
41a
45a
45b
45
45

FIG.29

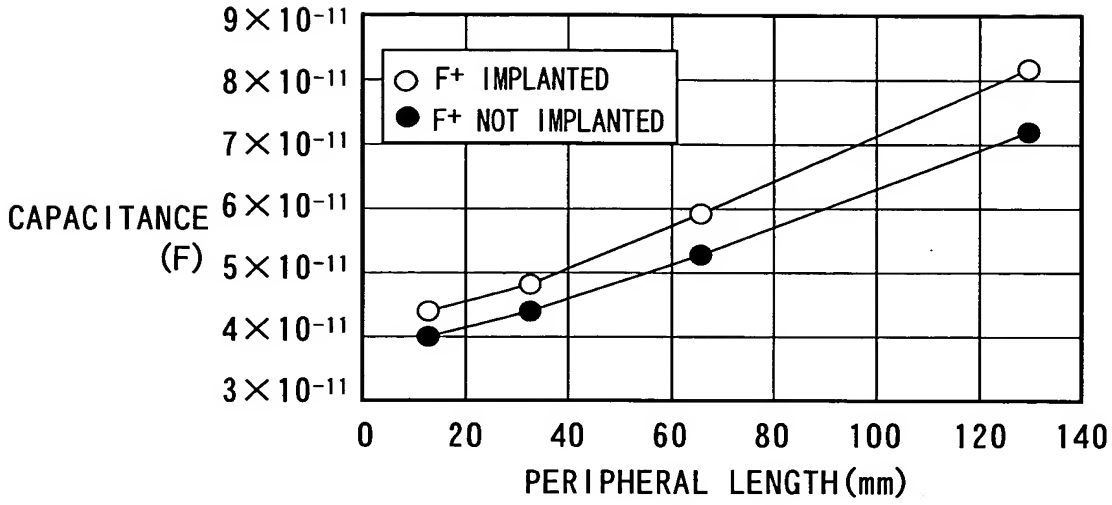

9×10-11
8×10-11
7×10-11
6×10-11
5×10-11
4×10-11
3×10-11
CAPACITANCE (F)
F+ IMPLANTED
F+ NOT IMPLANTED
0
20
40
60
80
100
120
140
PERIPHERAL LENGTH (mm)

FIG.30

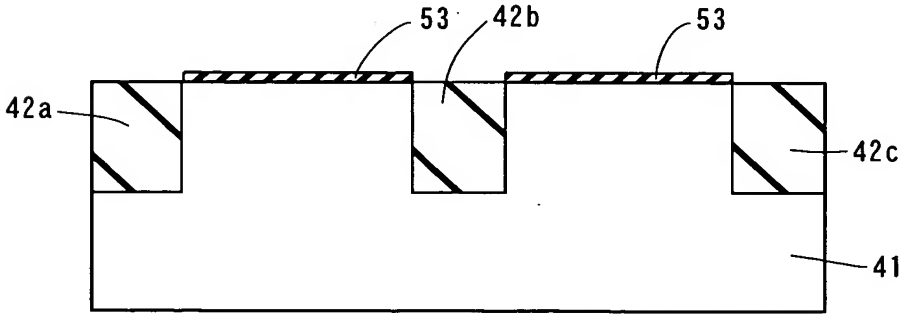

53
42b
53
42a
42c
41

FIG.31

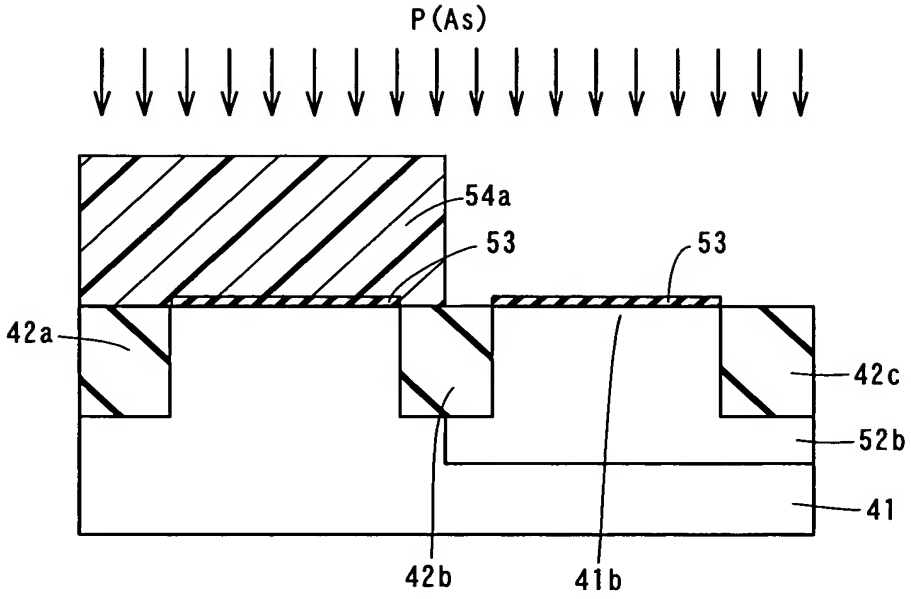

P(As)
54a
53
53
42a
42c
52b
41
42b
41b

FIG.32

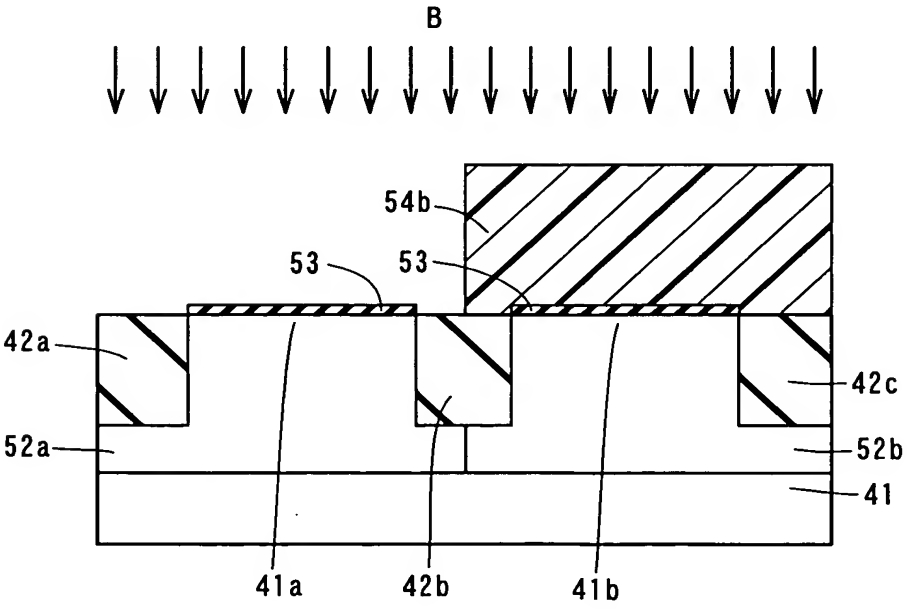

B
54b
53
53
42a
42c
52a
52b
41
41a
42b
41b

FIG.33

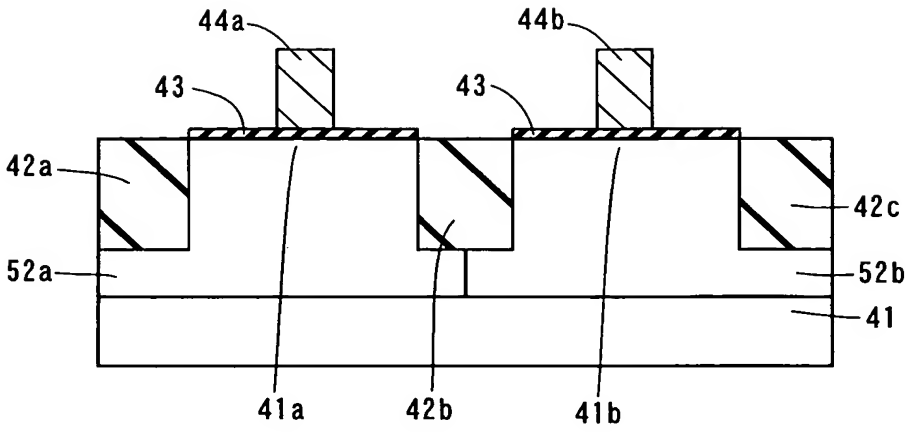

44a
44b
43
43
42a
42c
52a
52b
41
41a
42b
41b

FIG.34

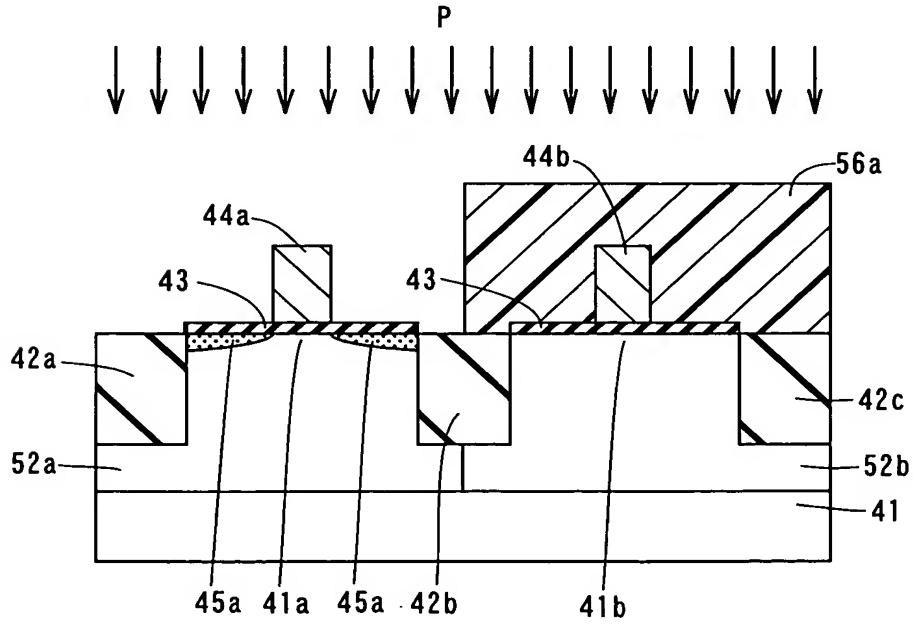

P
44b
56a
44a
43
43
42a
42c
52a
52b
41
45a
41a
45a
42b
41b

FIG.35

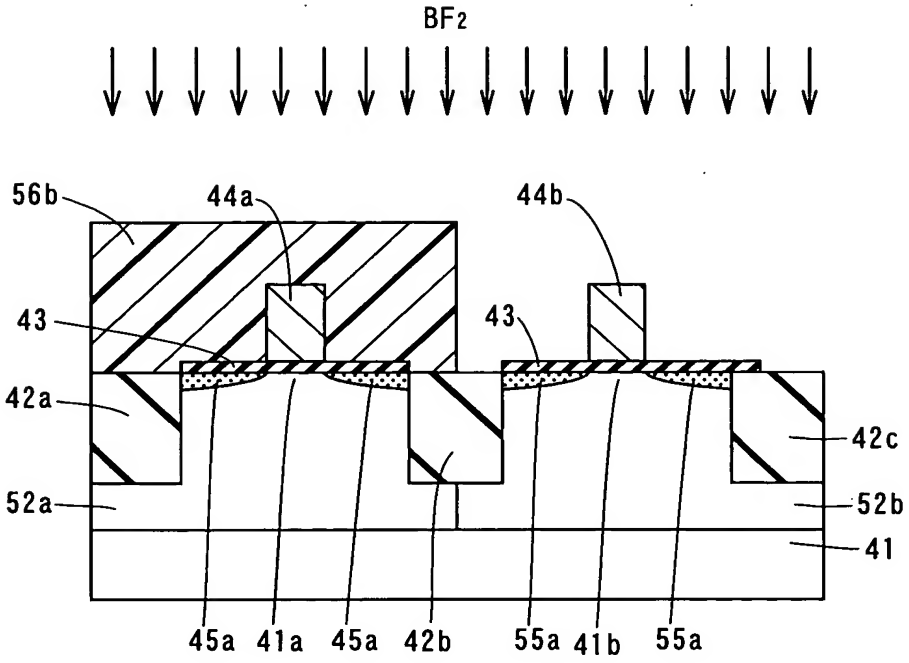

BF2
56b
44a
44b
43
43
42a
42c
52a
52b
41
45a
41a
45a
42b
55a
41b
55a

FIG.36

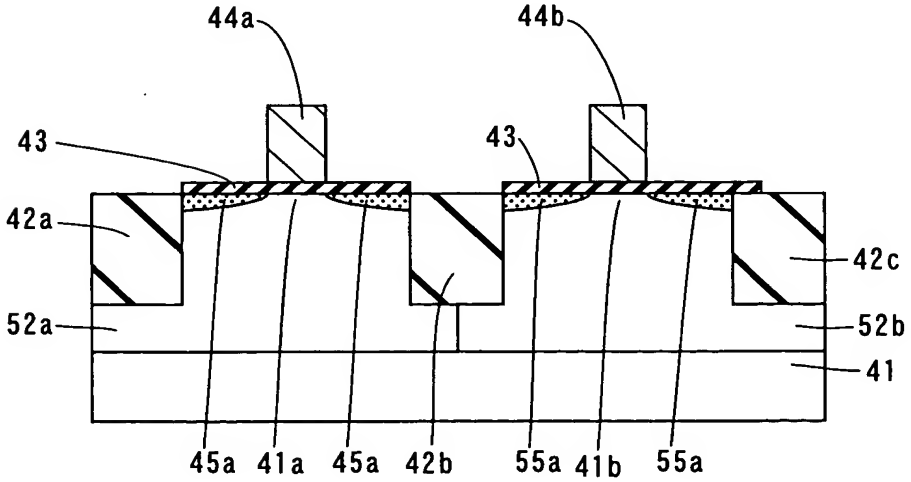

44a
44b
43
43
42a
42c
52a
52b
41
45a
41a
45a
42b
55a
41b
55a

FIG.37

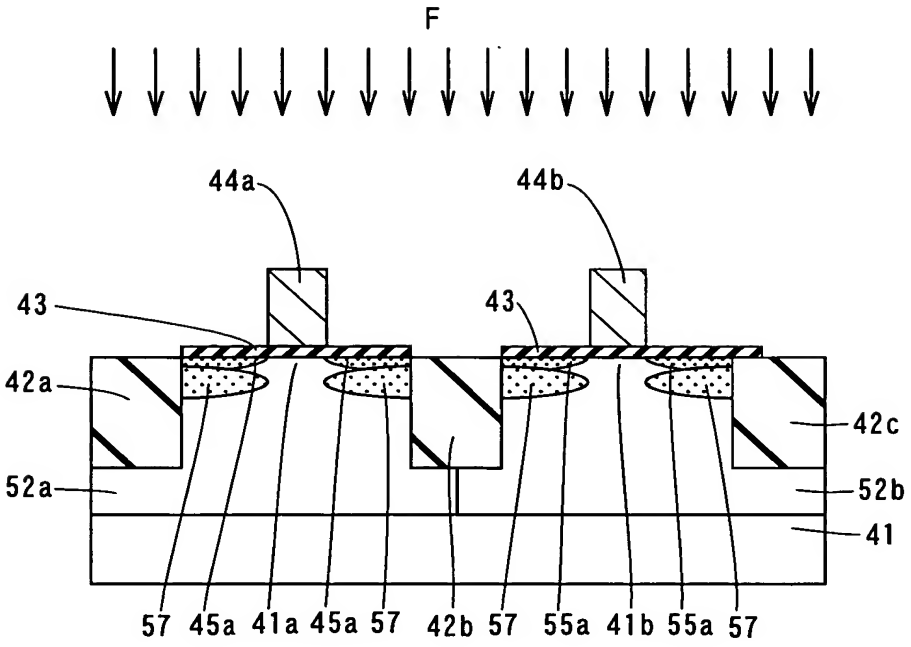

F
44a
44b
43
43
42a
42c
52a
52b
41
57 45a 41a 45a 57 42b 57 55a 41b 55a 57

FIG.38

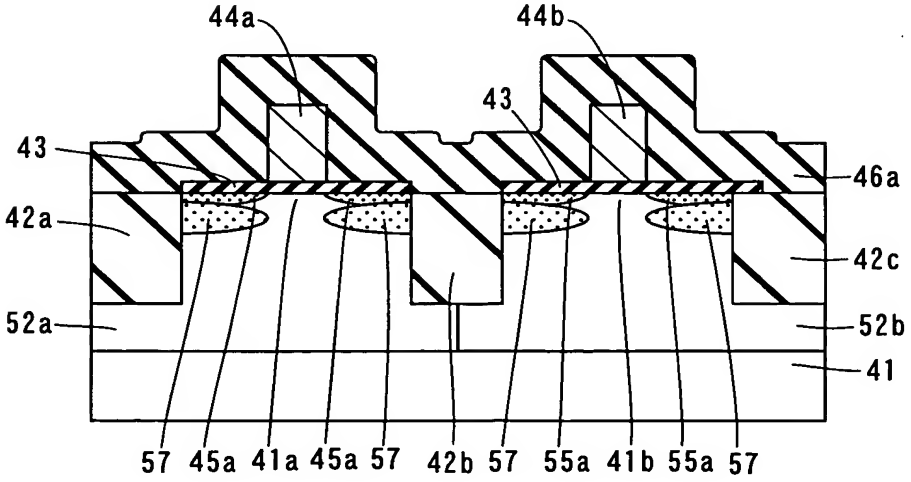

44a
44b
43
43
46a
42a
42c
52a
52b
41
57 45a 41a 45a 57 42b 57 55a 41b 55a 57

FIG.39

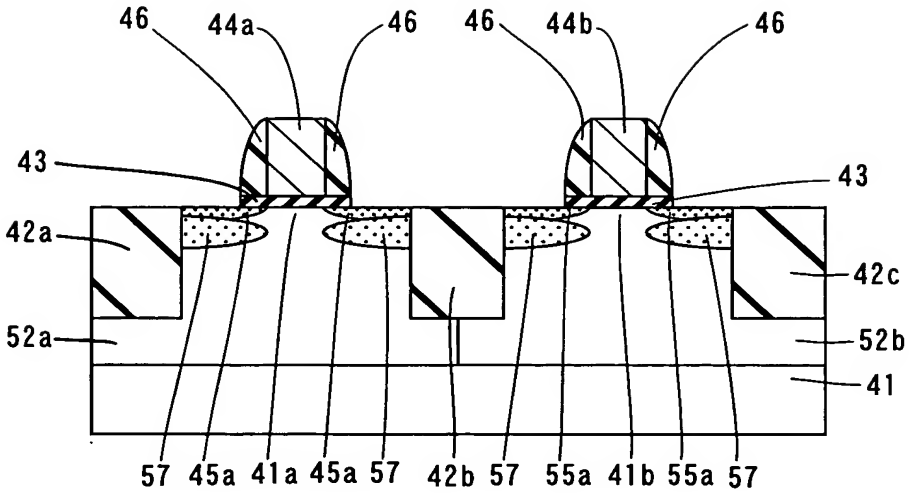

46
44a
46
46
44b
46
43
43
42a
42c
52a
52b
41
57
45a
41a
45a
57
42b
57
55a
41b
55a
57

FIG.40

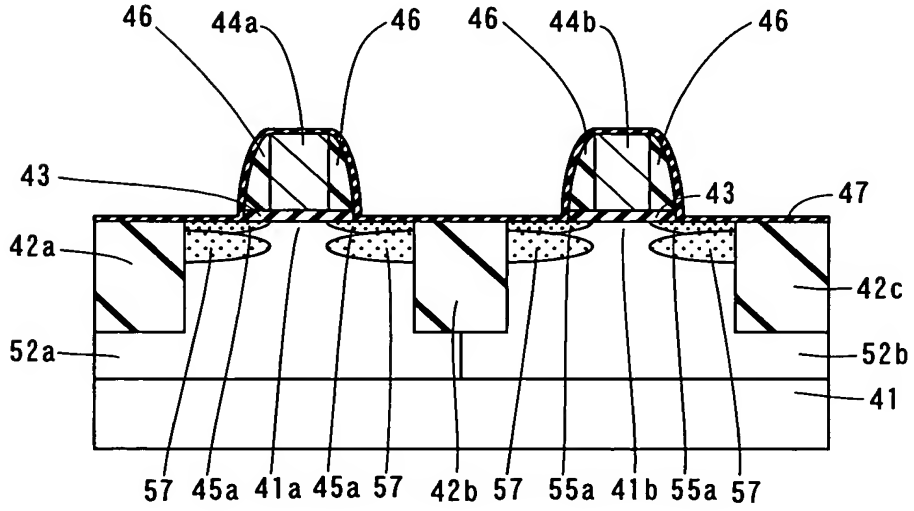

46
44a
46
46
44b
46
43
43
47
42a
42c
52a
52b
41
57
45a
41a
45a
57
42b
57
55a
41b
55a
57

FIG.41

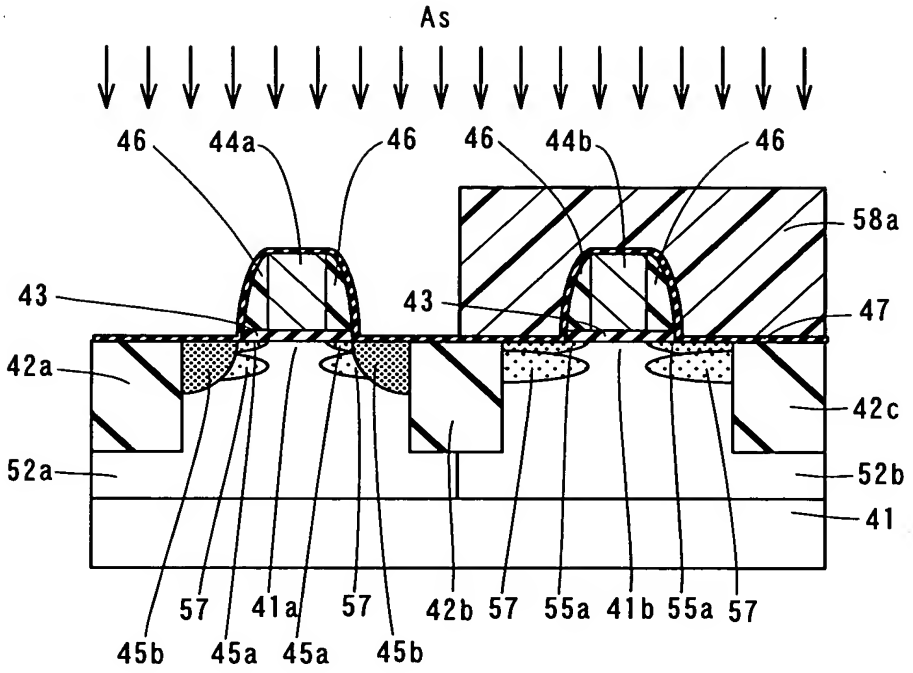

As
46
44a
46
46
44b
46
58a
43
43
47
42a
42c
52a
52b
41
57
41a
57
42b
57
55a
41b
55a
57
45b
45a
45a
45b

FIG.42

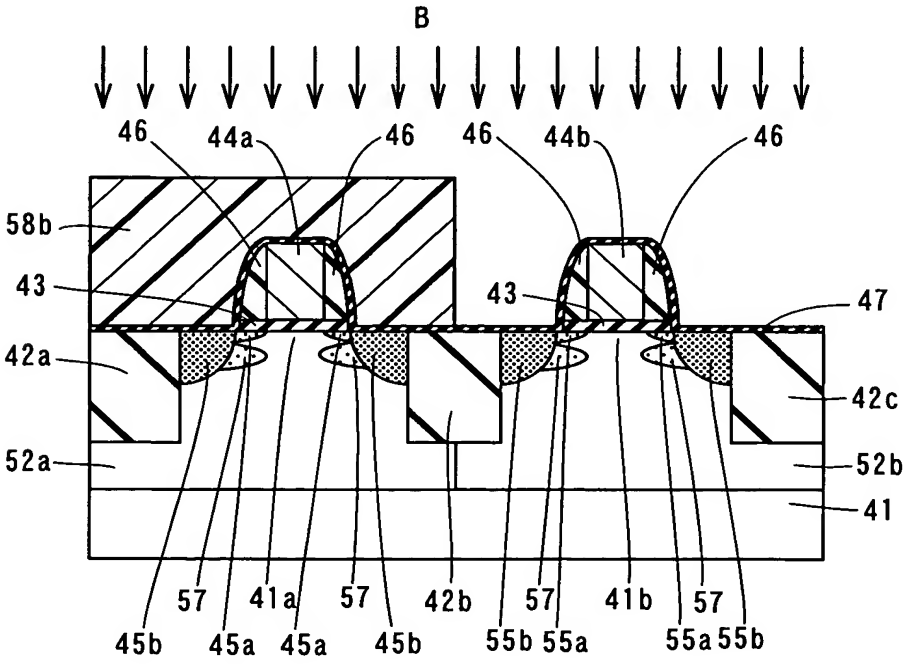

B
46
44a
46
46
44b
46
58b
43
43
47
42a
42c
52a
52b
41
57
41a
57
42b
57
41b
57
45b
45a
45a
45b
55b
55a
55a
55b

FIG.43

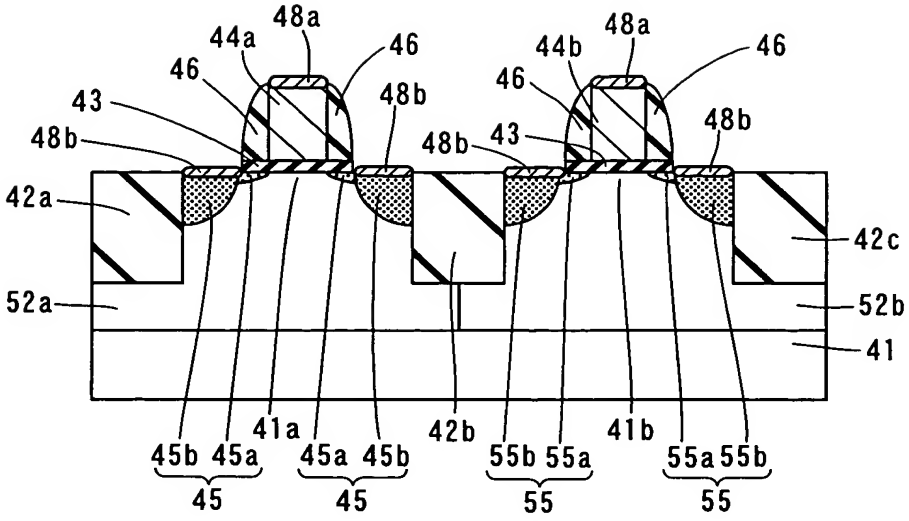

48a
44a
46
46
43
48b
48b
42a
52a
48b
44b
48a
46
46
48b
48b
43
42c
52b
41
41a
42b
41b
45b 45a
45a 45b
55b 55a
55a 55b
45
45
55
55

FIG.44

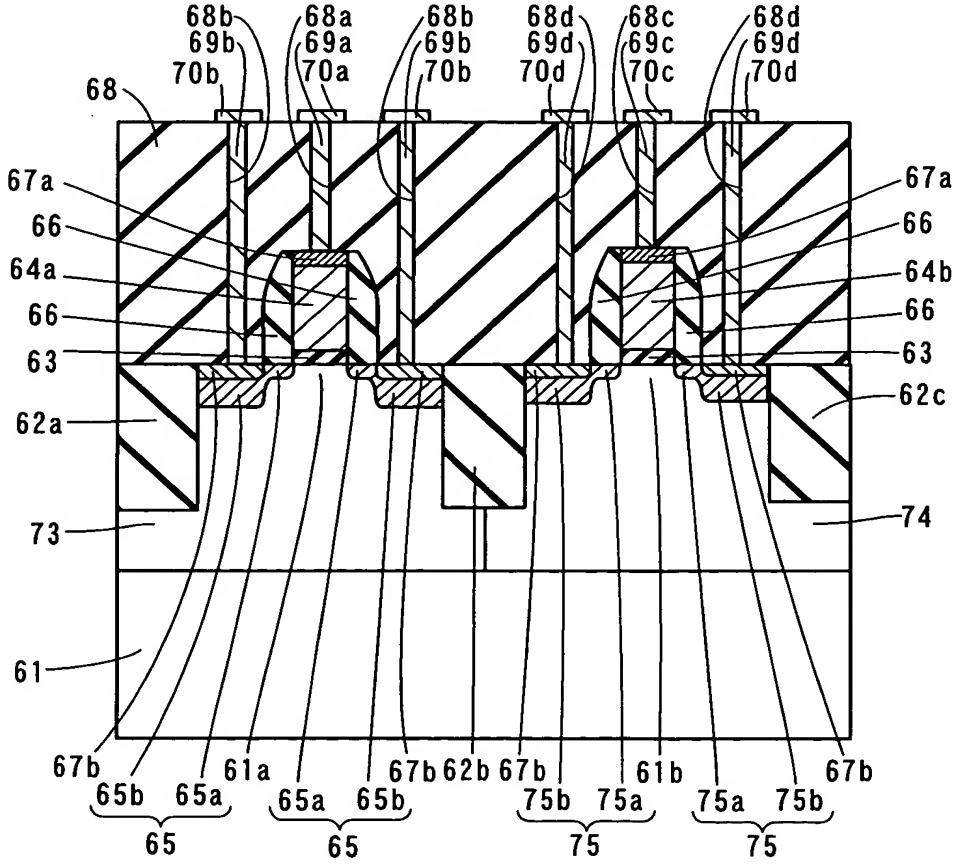

68b
69b
70b
68a
69a
70a
68b
69b
70b
68d
69d
70d
68c
69c
70c
68d
69d
70d
68
67a
66
64a
66
63
62a
73
61
67a
66
64b
66
63
62c
74
67b
65b 65a
61a
65a 65b
67b
62b
67b
75b 75a
61b
75a 75b
67b
65
65
75
75

FIG.45

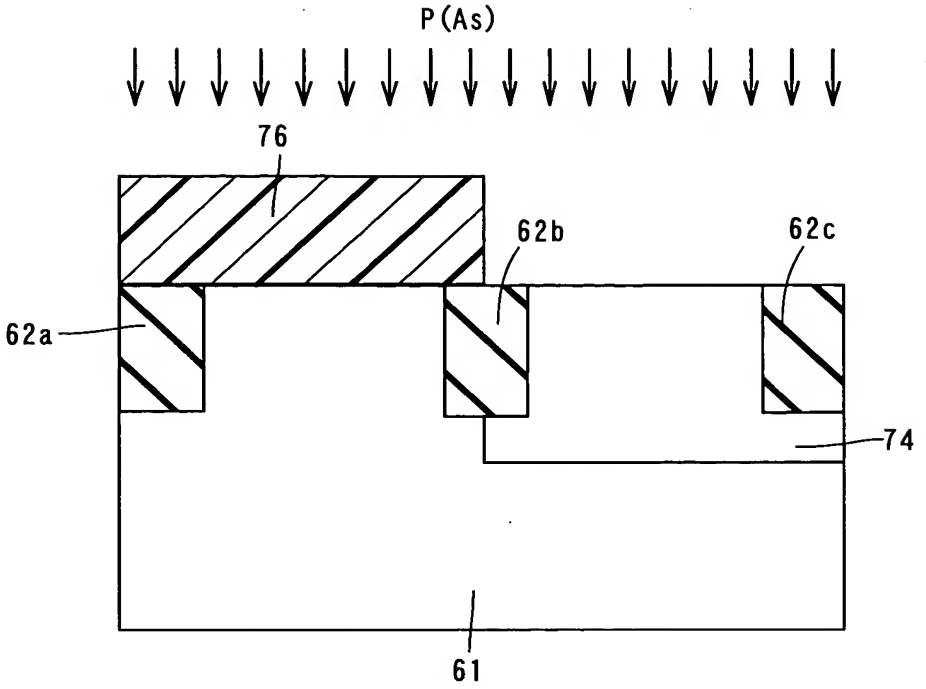


FIG.46

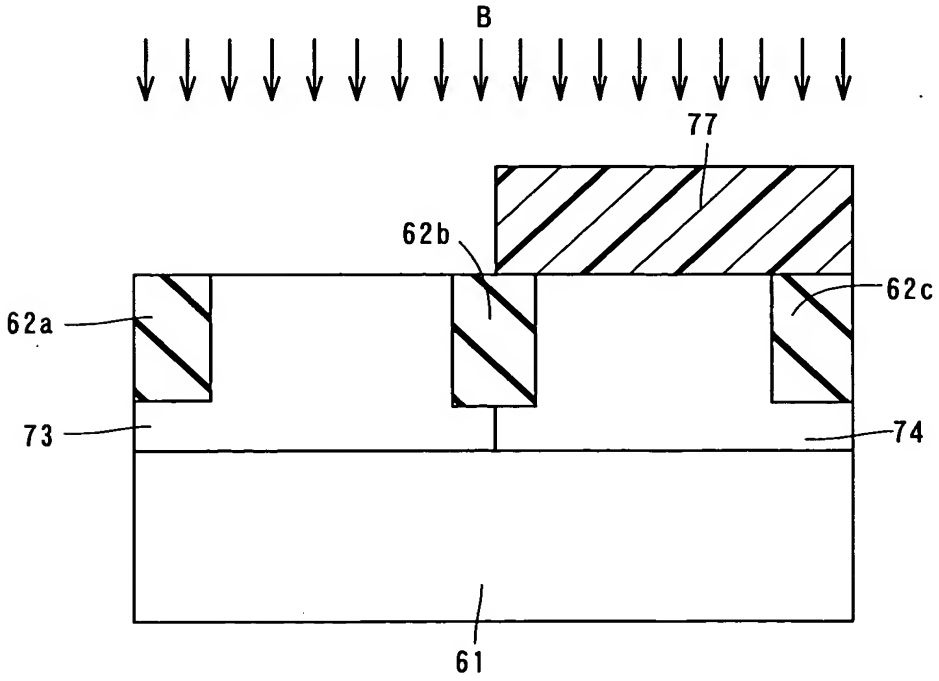


FIG.47

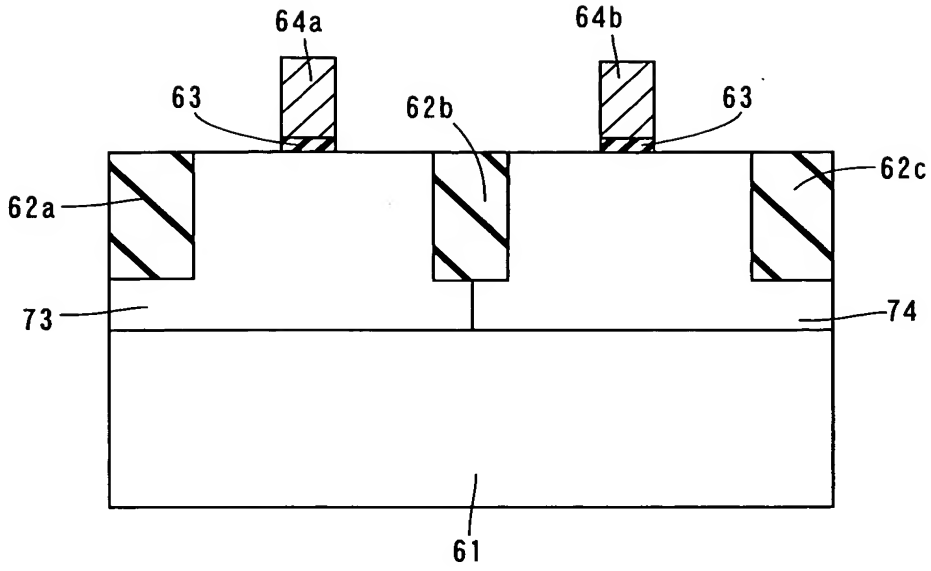

64a
64b
63
62b
63
62c
62a
73
74
61

FIG.48

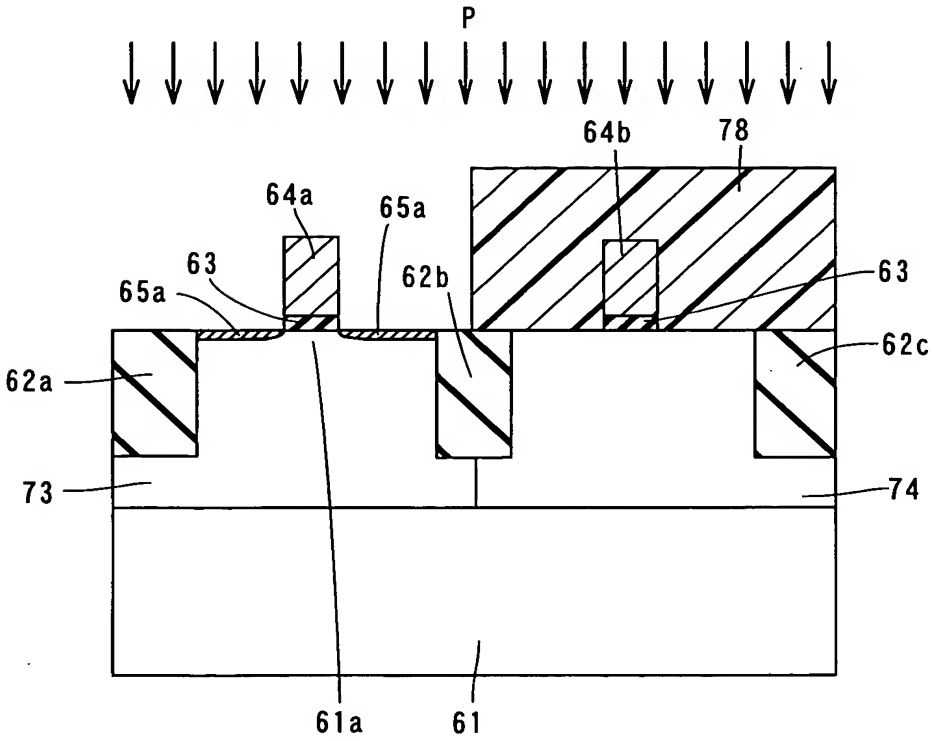

P
64b
78
64a
65a
63
62b
65a
63
62c
62a
73
74
61a
61

FIG.49

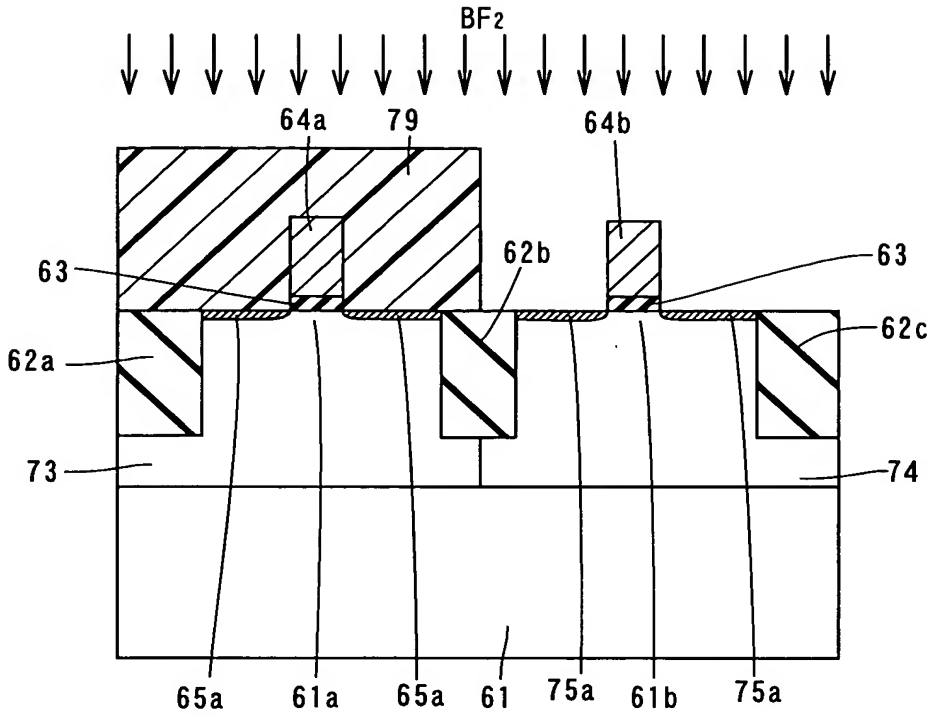

BF2
64a
79
64b
63
62b
63
62c
62a
73
74
65a
61a
65a
61
75a
61b
75a

FIG.50

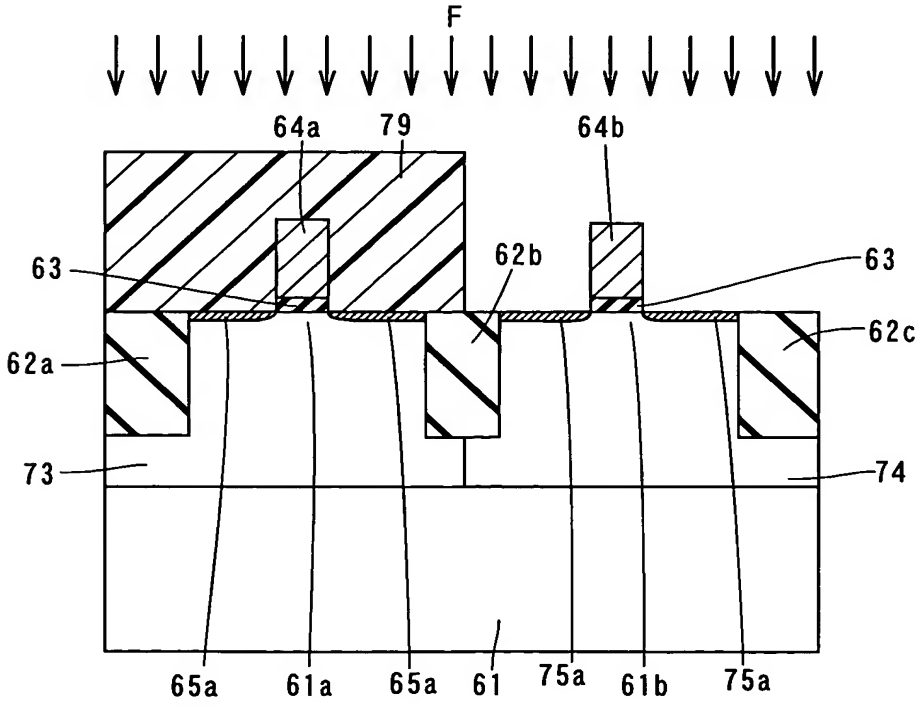

F
64a
79
64b
63
62b
63
62c
62a
73
74
65a
61a
65a
61
75a
61b
75a

FIG.51

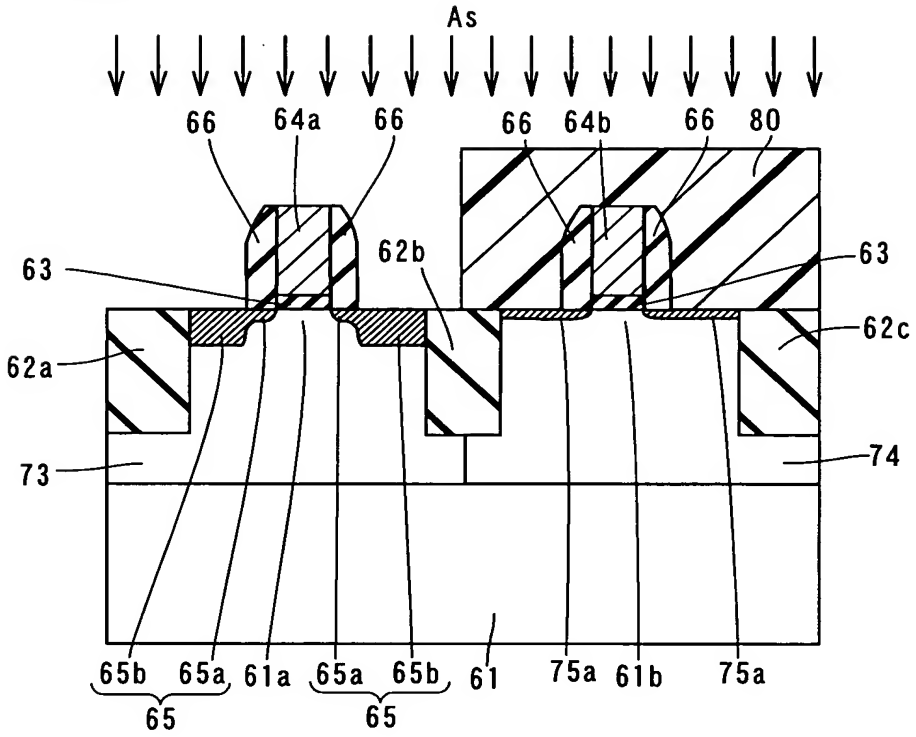

As
66
64a
66
66
64b
66
80
63
62b
63
62c
62a
73
74
65b
65a
61a
65a
65b
61
75a
61b
75a
65
65

FIG.52

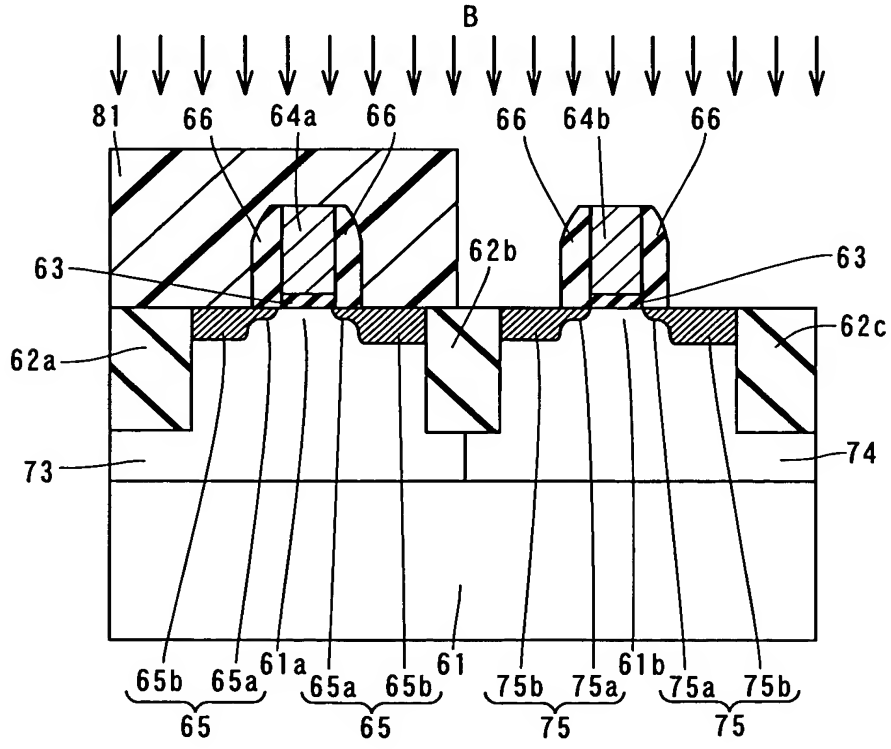

B
81
66
64a
66
66
64b
66
63
62b
63
62c
62a
73
74
65b
65a
61a
65a
65b
61
75b
75a
61b
75a
75b
65
65
75
75

FIG.53

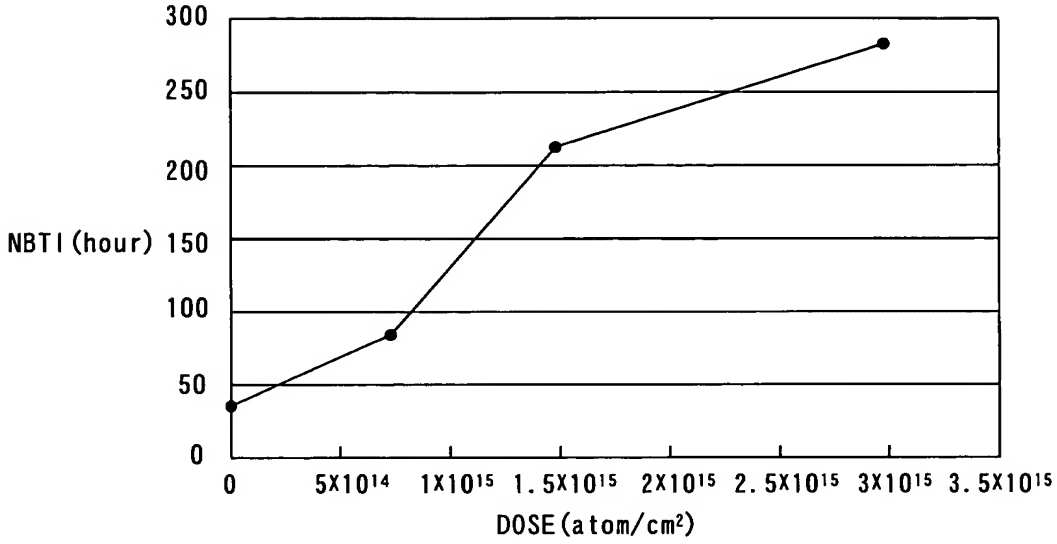
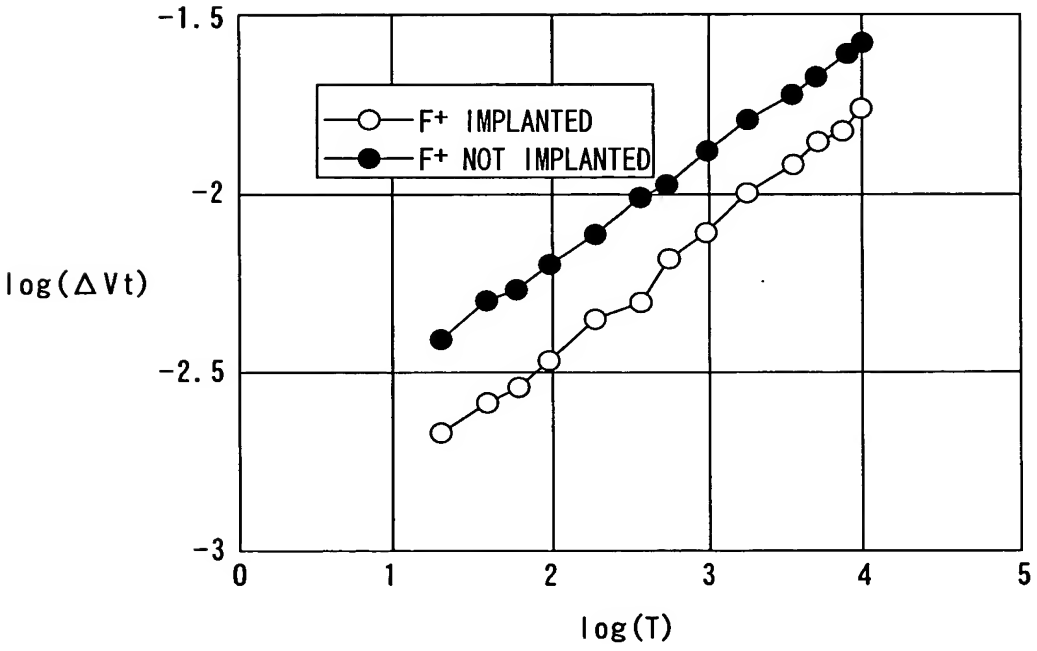

300
250
200
NBTI (hour) 150
100
50
0
0
5X10¹⁴
1X10¹⁵
1.5X10¹⁵
2X10¹⁵
2.5X10¹⁵
3X10¹⁵
3.5X10¹⁵
DOSE (atom/cm²)

FIG.54


-1.5
-2
-2.5
-3
log(ΔVt)
F+ IMPLANTED
F+ NOT IMPLANTED
0
1
2
3
4
5
log(T)